DOCUMENT RESUME

ED 133 098 RC 009 556

AUTHOR	Nonkin, Nikolai Tikhonovich
TITLE	Methodological Problems in Forecasting the Educational Potential of Rural Population.
INSTITUTION	USSR Academy of Sciences, Novosibirsk.
PUB DATE	Aug 76
NOTE	26p.; Not available in hard copy due to small print size of original document. Paper presented at the World Congress of Rural Sociology (4th, Torun, Poland, August 1976)
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Academic Achievement; Change Strategies; *Demography; Developing Nations; Educational Background; Foreign Countries; *Futures (of Society); *Models; Population Education; *Prediction; Research Problems; *Rural Population; Socioeconomic Influences
IDENTIFIERS	*Educational Potential; *USSR (Novosibirsk); World Congress of Rural Sociology (4th)

ABSTRACT

The change rates of sizes of groups with different educational levels are determined by demographic processes (death rates, ages, migration) and by recruitments from learning institutions and losses caused by moves into higher educational groups. The interrelationship of reproduction of individuals with different training is determined by shifts of population groups from one educational level to another. Total shifts of demographic generations through the educational sphere concurrently with movements from age to age, death rates, and migration is a process of reproduction which determines the structural dynamics of a population's educational potential. This potential's forecasting can be developed only by considering the demographic mechanism of the population's education reproduction in conjunction with its demographic projection. However, first it is necessary to: examine the static structure of population by education, in a form in which it presents itself at each time period; study the temporal patterns of its development; and represent these concepts in a model synthesizing both static and dynamic aspects of population education reproduction. A simulation model of this process has been devised at the Institute of Economics and Industrial Engineering, Siberian Branch of the U.S.S.R. Academy of Sciences, with the computer implementation of its algorithm. This paper summarizes the experience in using this simulation system for the development of long-run predictions of rural population distribution according to education. (NQ)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED133098

FOURTH WORLD CONGRESS FOR RURAL SOCIOLOGY
Toruń, August, 1976

RC009556

N.T. Nonkin

METHODOLOGICAL PROBLEMS IN FORECASTING THE EDUCATIONAL POTENTIAL OF RURAL POPULATION

Seminar # 11: The future of rural communities in industrialized socities.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Novosibirsk
1976

U.S.S.R. ACADEMY OF SCIENCES
Siberian Branch
INSTITUTE OF ECONOMICS

N.T. Nonkin

METHODOLOGICAL PROBLEMS IN FORECASTING THE EDUCATIONAL POTENTIAL OF RURAL POPULATION
(METODICHESKIE VOPROSY PROGNOZIROVANIA OBRAZOVATELNOGO POTENTSIALA SELSKOGO NASELENIA)

Preprint

Novosibirsk

1976

Abstract

A demographic conception of education reproduction is examined. Continuous renewal of the body of persons with particular educational attainments as a result of training in particular educational sections, on the one hand, and of movement along age scale is, according to the author, a process of reproduction.

A simulation model of this process has been devised at the Institute of Economics and Industrial Engineering, Siberian Branch of the U.S.S.R. Academy of Sciences, with the computer implementation of its algorithm. The paper summarizes the experience in using this simulation system for the development of long-run predictions of rural population distribution according to educational attainments.

* *
*

One of the components of the contemporary scientific technological revolution is educational revolution connected with a changed functional role of man in productive process and with a rise in his creative and intellectual abilities. The educational potential of a society will essentially determine not only the intellectual level of its members, but also the dynamics of economic growth and the efficiency of public reproduction: "... rates of our advance to communism are increasingly more dependent on intellectual potential of a society, on the development of culture, science and education" (Brezhnev, 1974).

The tasks of wiping out essential socioeconomic rural-urban differences by intensive development of farm production, of other branches, of services involve the need for rapid growth of educational attainments of rural population. This practical need, in its turn, involves certain theoretical problems requiring additional research. Such, in particular, is a task of developing methods for forecasting educational potential depending, first, on the anticipated trend in educational sphere and, second, on the type of demographic reproduction.

In socioeconomic studies of education there are various trends. In particular, a considerable number of mathematical models have been developed which can be divided into models of educational sphere proper and of its interaction with national economy. The models of educational sphere proper, according to an authoritative scholar in this field M. Blaug, was the "refusal from petty ambitious attempts to associate education exactly with parts of economy in favour of mathematical modeling of educational system understood as a "closed system" (Blaug, 1970:107). Such models embrace either the entire sphere of education according to their boundaries with other societal subsystems, or represent separate aspects of this sphere with a certain degree of detailing. In any case they represent people's passing through educational sphere and different facets of this process.

Mostly known in this field are models suggested by R.Stone and by Moser and Redfern. R. Stone applies the idea of input-output method to movements of population into this sphere and of students within it in relation to probabilities of shifts between various states. The model well represents the composition of students but it does not incorporate the effect of sociodemographic shifts on educational attainments of population (R. Stone, 1967).

The Moser and Redfern's model represents the movements of students through different links of educational sphere and among them in conjunction with teachers' movements and

makes it possible to study their relationship (Moser and Redfern, 1966).

Known are models developed by the Soviet researchers Bermant, Semionov and Sulitsky (1972) and a model of demographic processes in educational sphere development devised by B. Lialaev (1975:73). From the model of educational potential reproduction of the population of a country or a region, the latter model differs, first, by nonrecognition of the age of all categories of students, second, by nonrecognition of the population of the entire educational sphere differentiated by education and age, and, third, it recognizes only full-time education (without part-time and by extension). The main idea of this model, however, is rather close to that exposed below. The educational models developed in the DDR permit one to confront workers' educational attainments with requirements of these attainments on the part of jobs (Khachaturov et al., eds., 1975).

The former model reflecting changes in education of population related to learning and to sociodemographic shifts was proposed by the prominent Soviet statistician-mathematician A.Ya. Boyarsky as early as 1928 (Boyarsky, 1928). He studied the factor of changes in literacy during the period between two censuses of 1896 and 1926, and among them the effect of measures of liquidating illiteracy undertaken by society. This detailed and sophisticated study (it is enough to say that it recognized a possibility of forgetting how to read and write) was a simplest model of reproduction of population education where the amount of education was measured only by percentage literate without differentiation into separate links.

Thus, the model suggested by us is a natural continuation of ideas developed by other researchers in this field.

The change of the educational potential of population is a complicated process as educational level of rural dwellers is formed through learning both within and without rural community, on the basis of extension and through population exchanges between urban and rural areas.

The rates of changes of sizes of groups with different amounts of education are determined, on the one hand, by demographic processes, i.e. death rates, shifts between ages, migration and, on the other, by recruitments from learning institutions and losses caused by moves into higher educational groups. And the interrelationship of reproduction of individuals with different kinds of training is determined by shifts of population groups from one educational level to another. The total shifts of demographic generations through educational sphere concurrently with movements from age to age, as well as with death rates and migration is a process of reproduction which determines the dynamics in the structure of population educational potential.

The forecasting of this potential can be developed only by taking into account the demographic mechanism of the population education reproduction, i.e. in conjunction with demographic projection. This approach presupposes the development of a concept about demographic mechanism of population education reproduction in which education formation completely merges with the process of the reproduction of population itself. First it is necessary to examine the process under study in statics, i.e. to investigate the static structure of population by education, in a form in which it presents itself at each time period, then to study temporal patterns of its development, and, lastly, to represent these concepts in a model synthesizing both static and dynamic aspects of population education reproduction.

The educational level of a specific group of people is composed of amount of education attained by each member and is measured either by average years or by distribution proportions of total population among groups with different educational levels. According to this, educational potential may change as a result of increase in educational attainments of individuals and of renewal of population, and the latter process may result not only in increase but in decrease as well. Thus, population educational potential is at the same time a result of previous training of people

in the sphere of education and of natural renewal of generations.

The educational sphere permanently holds a certain part of population. Children of school age and adolescents in the U.S.S.R. under contemporary conditions are included into it completely. Various kinds of education embrace a fourth of productive national population, and in the age of 7 to retirement each third person is getting education.

It is obvious that the number of students and educational level are directly interconnected. This connection, however, shows up mainly in dynamics since absolute number of students and their allocation proportions among the links of educational system at the initial time moment determine all subsequent changes in population education.

The continyous renewal of the composition of persons who were members of different age and educational groups is a process of reproduction. At each moment of this process different population groups are characterized, on the one hand, by their age, and, on the other, by educational level and being either within or without a certain link of educational system (Fig. 1). The schematic model presenting such a dynamic relationship is shown in Fig. 2.

Dynamic unlike static representation reveals the interaction of population flows with educational sphere and the effect of its particular links on the formation of educational level of population. The initial link is full-time comprehensive school after completing which the youth is allocated into other links of this sphere or in various employment spheres. Separate educational links are hierarchically connected: entrance to a certain kind of learning institution is conditional on having achieved the previous educational level.

In the dynamic scheme of population movements between educational links, however, the static moment which is not only a "dead photograph" of the process, but contains in itself its acutcome also, i.e. population educational level characteristic of this moment, is not reflected. For

Figure 1.
Scheme of distribution by age, type of training and educational attainments (a conventional example)

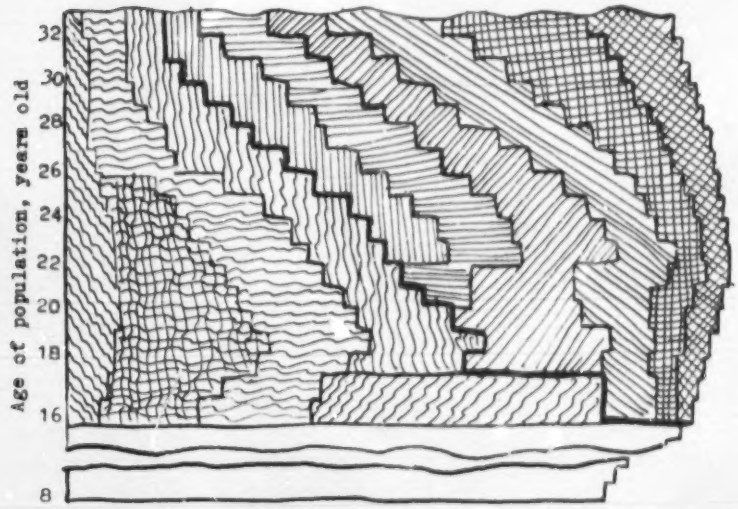
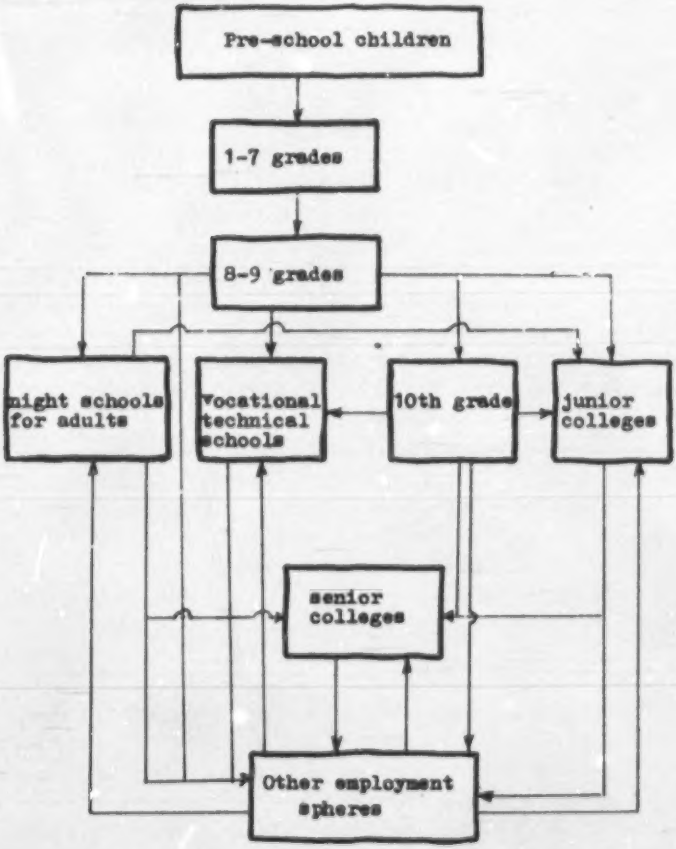


Figure 2.
Scheme of population passing through
educational sphere



holistic representation of the real process it is necessary to synthesize these two representations and to devise a model which would simultaneously reflect population distribution by age, educational level, educational links (Fig. 1) and its movements through the links of this sphere over time (Fig. 2).

The model of educational reproduction as any model in general simplifies the real process by not taking into consideration its special and fortuitous traits, representing only chief manifestation of reality, and those with pretty much crudity. The assumptions of the model proposed, however, agree with statistical data on the appropriate aspects of educational reproduction in the U.S.S.R. under present conditions. These assumptions are as follows:

1. Educational sphere is represented by students and learning institutions.

2. Learning institutions are divided into senior colleges, junior colleges and other special learning institutions, comprehensive schools (full-time and night schools), rural vocational training schools.

3. Students' age is limited from the "bottom" and from the "top".

4. Children go to school at an age of 7; if anybody is retained in a grade for one year, this can occur only once. Pupils may drop out of the full-time school and not get further education, but not before 8-grade graduation.

5. Besides full-time education (off-the-job), there is part-time and extension education.

6. Night schools: 8-th, 9-th, 10-th and 11-th grades.

7. The period of education in colleges and junior colleges is 4-5 years, in secondary vocational technical schools 3 years; the youth with secondary education enter junior colleges directly to the 2nd year.

8. Age range for those entering full-time higher learning institutions is 17-20; part-time, 17-25; full-time junior colleges, 15-19; part-time, 15-24; rural vocational technical schools, 15-17; night comprehensive schools, 14-24 years of age.

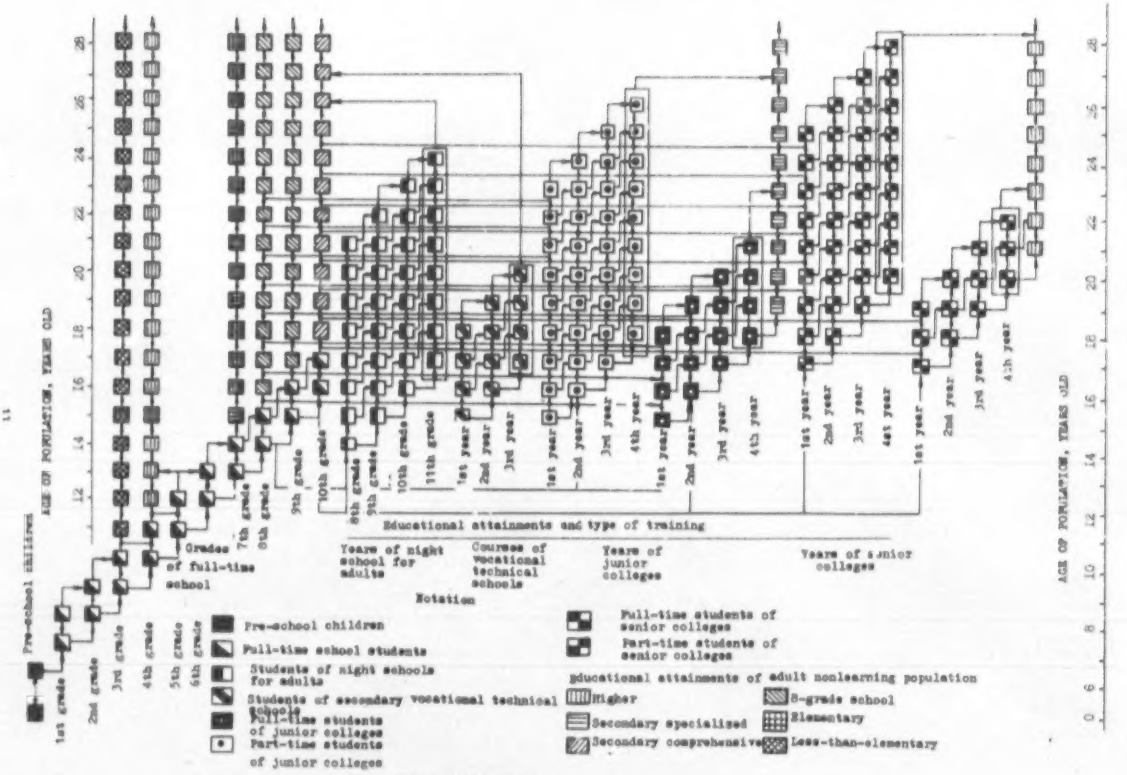


Figure 3. Scheme of the model of rural population education reproduction

9. All population is divided into the following categories: 1) pre-school children; 2) school children; 3) all students except school children, students of night schools and extension courses among them; 4) adult nonlearning people divided into educational level groups.

10. Adult nonlearning population consists of 8 groups, having the following educational attainments: 1) higher; 2) secondary special; 3) secondary comprehensive; 4) 9-grade; 5) 8-grade; 6) 6-7-grade; 8) under 4-grade (less-than-elementary).

The grouping by educational level does not entirely coincide with that accepted in statistics. First, the category who attended college without completing is absent; second, the group referred to in statistics as "less-than-secondary" education is divided in our model into two (the fourth and fifth groups), and the group "elementary" education is also divided into two (6-7- and 4-5-grade). These modifications were prompted by specific features of rural people's education. In rural areas the percentage attended college without completing is too small, and less-than-secondary, reversely, fairly large.

The above conditions specify the static aspect of educational reproduction of rural population in terms of population distribution among educational spheres, and dynamic, of opportunities for population movements. The model itself is presented in Fig. 3.

Its outlook reminds of honeycombs with different positions along the abscise and ordinate axes. Each cell, or model element , represents a population group described, first, by particular age, second, by extent of education and, third, by being either within or without a particular educational link. The state of society at each time moment is characterized by proportions of population distribution among the model elements. Dynamic processes changing the educational potential of a society, are manifested in changed sizes of population groups corresponding to different model elements.

The ordinate axis represents population ages at an interval of one year, and the abscise axis, kinds of learning institutions and types of training (full-time, part-time, night schools, extension courses), as well as the attainments of those who at present are outside the system of education (except children). Time in this model is discrete measured in years. The arrows show possible movements of population in the cource of a year. The movement into subsequent age is obligatory and three types of movements, i.e. 1) between educational sphere and other employments; 2) within certain educational system links; 3) between these links, are probabilistic. Deaths, migration as well as drops-out from education are taken into consideration at each annual movement but are not shown specially on the scheme.

Population movements start from the age of one year. Next year this group passes into the next age group, being replaced by a group of newly born. The final stage of movements is 100 years of age.

The conception of demographic mechanism of educational potential reproduction, as was already noted, includes both static and dynamic aspects. Static aspect is an element of the dynamic and characterizes the initial and final states of the simulation system of the reproduction of population education. The sequence of static states is determined by dynamic transfers from age to age in conjunction with transfers between educational sphere links and other spheres of life activity. Sociodemographic flows enter the sphere of education, pass through it and go out to other spheres, thus forming the educational potential. According to this conception educational reproduction entirely merges with demographic reproduction and occurs jointly with natural and mechanical movement of population.

In terms of our model, the lifetime of an individual is a discrete sequence of states in three dimensions: age, kind of training, level of education. After being born and reaching 7 years of age, he goes to the first school grade.

In a year, after reaching 8 years of age, he either gets his remove to the second grade, or is retained in the first grade for one year. After completing 8 grades the 15 year old has several alternatives before him: 1) to go to the 9-th grade; 2) to junior college; 3) to a specialized school; 4) to get an employment. In the latter case again: to cease education, or to go for further schooling on a part-time basis, and in this case in what particular institution. Then, after further schooling and becoming older, he joins a certain educational group of this age, and he has new opportunities for raising his education.

The simulation of sociodemographic movements of population permits one to predict educational potential of society, i.e. educational attainments of population and student compositions of various learning institutions. This is done concurrently with forecasting the development of educational sphere and probable dimensions of demographic reproduction of population including anticipated number of born in each year.

The considered model (with cimputer implementation of its algorithm) was used by us for long-run forecasting of educational potential of the Siberian countryside population. In the process of this work essential methodological problems in predicting educational potential of rural population have been detected which will be dwelt on below.

We have already noted that the educational potential of rural population is formed both in rural and urban areas. The rural-urban exchange of population with different educational attainments is made through voluntary migration as well as through placements of young graduates from urban to rural areas. To predict educational potential of rural population it is necessary to have projection of educational sphere not only of the rural side, but of urban places as well. And the crucial information is that about dimensions of anticipated rural-urban migration.

The prediction of educational potential of rural population in a region opened for migration is a far more compli-

cated task than in closed (e.g. nationally). In an open region rural-urban exchange is not only within it but with other regions of the country as well. In practical calculations the training of young specialists in urban areas outside the administrative region under consideration has been related by us to net migration of rural population.

The absolute number of students is determined by various factors , by which learning institutions can be divided into three types. The first type includes institutions in which the number of students is determined by educational sphere possibilities, in other words, by number of places. In our projections these were higher and secondary specialized learning institutions. The second type embraces such educational links in which the number of students is determined by demographic factors, i.e. by sizes of the appropriate generations. In the context of contemporary Siberian countryside these are 8-grade day school (1-8 grades). The third type are learning institutions in which the number of students is determined, first, by absolute number of young people, and, second, by their wish or at least consent to study just there. In our projections these are 9-10 grades of day, night and part-time schools, as well as vocational technical schools.

The forecasting of educational potential begins with finding out the initial distributim of population by ages, places in educational sphere and extent of education. The appropriate data are taken from censuses and representative sociological surveys. In prognosticating studies, however, it is especially important to take into consideration not only structural, but also genetic traits of the object. To predict the future state of a process is possible only knowing its structure, movement and development mechanism forces. As structural units identified are elements allowing us to explain the genesis of the object as a whole and predicting begins with defining anticipated states of exogeneous structural elements of the object of investigation. Endogeneous elements are determined as a result of model

calculations and then the coordination of all parts of projection, or scenario synthesis, takes place.

The predicted dimensions which it is possible to bring together into the following groups, are incorporated into the model:

1) indicators of natural and mechanical movement of population (death rate is differentiated by ages, and migration rates not only by ages, but also by parameters associated with education);

2) number of places in rural learning institutions of each type, intensity of enrolment of rural population and placements of young graduates to rural areas;

3) size of population with less-than-secondary education entering night schools;

4) movements of population within the educational sphere;

5) number of born in each year of the projected period.

Next stage in forecasting development, after devising theoretical conceptual framework and mathematical model of the process under study, is finding out possible forecasting methods and their number. The prognostication science identifies three large classes of prediction methods: I - extrapolation, II - modeling, III - Delphi method. In practice these three groups are applied in close interconnection, predicting models presuppose extrapolation of the evaluation, and the latter is a sum total of extrapolation and mental modeling of judges of the object of investigation. Extrapolation and expert evaluations are used for predicting anticipated states of the structural element of the object of prognosis.

The forecasting science distinguishes two extrapolations - simple and comparative. Simple extrapolation continues developmental tendencies of the object by different methods ranging from the simplest visual ones to sophisticated methods of mathematical statistics. Comparative extrapolation assumes the existence of an object which outstripped in its development the object under investigation thus purporting to replicate its history. Thus, many quantitative

and qualitative socioeconomic indicators of life activity of rural residents follow the urban ones (the inclusion of adolescents into schools, educational level of population etc.).

Expert evaluations are divided by us into two kinds:
1) expert evaluations developed by state committees;
2) other expert evaluations including publications and opinions of specially selected groups of specialists.

In studies of specific social nature, along with the considered prognosticating methods, i.e. modeling, expert evaluations and extrapolation, a special role is played by value orientations of population, their attitudes and life plans taken into consideration. The results of contemporary studies prove high efficiency of their utilization at developing hypotheses, and the recent recommendations of prognostication science presuppose their compulsory use in social prediction (Shlapentokh, 1975). This method among other prognostication methods application has limits of its own, and the art in making projections is flexibility in using various prognostication procedures for substantiating futures judgements. By way of consistent application of the selected set of prognostication methods to the identified object elements particular fragments of the futures scenario are developed. The scenario is an all-round description of the situation which may appear in the public life sphere under consideration (in our case, in the development of educational sphere and of educational level of population) in the course of the implementation of a particular version of its development.

By integration of individual projections the scenario accumulates data about events relevant for the process being predicted. The crucial part of prediction studies is synthesis of the scenario providing for the consistence of partial projection conclusions. The assumptions about the development of the object of investigation may prove to be inconsistent due to predicting the integral object "in parts" and thus breaking its integrity or, else, may

be consistent, but the prediction results by these assumptions may be inconsistent with the normative conception about the future which would be a violation of integrity of a system into which this object is included as its element. The existence of a mathematical model does not free the researcher from drawing up a scenario synthesis. The scenario synthesis is bringing partial fragments of the future reflected in the projection of individual structural elements of the model into a common conception of the anticipated social situation connected with the development of the object of investigation.

The procedure of scenario synthesis presupposes going back to the formation of assumptions and to their revision. While doing this, revised are not only projection assumptions but also normative conceptions about the future down to changing pre-set purposes. Iterations of hypotheses revision are done down to the full synthesis of the scenario in which separate disjointed ideas of the future will merge into consistent picture of the expected state of the object under investigation. In the course of iterations the possibilities to counteract negative and to intensify positive features discovered in the analysis of dynamic trends and in their synthesis into a single entity which may appear in the projected period are as if simulated. The backtrack to already stated hypotheses for their revision is a feature distinguishing organizational and program projections from simpler searching ones and is qualified here, along with expert evaluations, extrapolation and recognition of value orientation of the population, as an independent technological method for drawing up projections.

It is apparent that not all methods, even among those specially selected, can be applied with equal success to projection of all structural elements of the process under study. Thus, value orientations and life plans can be used for substantiating hypotheses about birth rates byt not for death rates projections. It is necessary to note the possibilities of applying each procedure to the elements

+ procedure is used
x procedure is used partially
- procedure is not used

Table 1

Projection procedures and structural elements of the object of projection

Projection procedures	Structural elements of the object of projection									
	Demographic movement			Reproduction of comprehensive education					Reproduction of higher and high specialised education	
				Distribution of 8-grade leavers						
	Birth rate	Death rate	Migration	employments	junior colleges	9th grade &	vocational technical schools	Night schools for adults	Full-time learning and placement of young specialists	Part-time education of rural population
1. Simple extrapolation	+	+	+	+	+	+	+	+	+	+
2. Comparative extrapolation	+	+	x	+	+	+	+	+	+	+
3. Expert evaluations of state committees	+	+	-	+	+	+	+	+	x	x
4. Other expert evaluations	+	+	+	+	+	+	+	+	+	+
5. Recognition of value orientations, attitudes and life aspirations of population	+	-	+	+	+	+	+	+	x	+
6. Iterative process of hypotheses revision	-	-	+	x	x	+	+	-	+	+

of the process under investigation for developing projections. In summarized form this is presented in Table 1.

The changes in population structure by education is essentially related to the selected version of birth rates in the projected period.

The number of born is a function of the absolute number and age composition of women, as well as of their fertility level. In the long run it is determined concurrently with the construction of the overall demographic prediction, i.e. is its endogeneous element. At the same time the prediction of number born necessary for practical use of the model algorithm is torn away from the demographic projection of educational potential of population. To overcome this disparity a usual demographic projection is developed with the same dimensions of migration and death rates which will be incorporated into the projection model of the population educational potential. The size and age composition of population in this purely demographic projection and in the demographic cross-section of the educational potential projection fully coincide if the number born is introduced from the first to the second.

The change in educational attainments of youth refilling the generations of the employed in national economy introduces a fundamental difference into the production of relatively high and relatively low kinds of education. Thus, back in the 1930s in our country part of adolescents (mainly rural dwellers) started their gainful activity with less-than-elementary education. In the 1950s nearly all the youth were equipped with not less than elementary, and in the 1960s not less than 8-grade education. At present the shift to compulsory secondary attendance is being completed, and the number of people with education less than secondary is diminishing as a result of processes of ageing and dying.

To summarize, under contemporary conditions reproduced on a large scale are three types of education: higher, high specialized and high comprehensive , whereas the

number of persons with less-than-secondary education or even less than that is reproduced on a small scale, so that in 30-40 years among the employed population of the U.S.S.R. persons with this educational level will be practically absent.

The use of the developed simulation system for predicting educational potential of rural dwellers exemplified in the Siberian countryside permitted us to opportunely detect expected discrepancies in the development of rural educational sphere. In particular, the decline in birth rates which was taking place during the 60s will lead to a sharp drop in the number of rural school children and to diminished numbers of secondary and 8-grade school graduates. With current proportions in the distribution of 8-grath graduates into further spheres of education kept constant, rural vocational technical schools will find themselves "naked" in the future. The analysis of the scenario in this field involved multiple revisions of initial hypotheses, and in the future an exceptionally wide range of versions of coincidence of the system of comprehensive and vocational training of rural dwellers is possible.

In the projected period anticipated is a considerable growth in educational level of the gainful rural population due to sharp difference in educational attainments of the youth entering employments and aged retiring people. And since the professionals always more intensively migrate from farm to city, rural population exodus due to this factor will grow in the future. This involves a number of other problems for the Siberian countryside which has a long-standing labour deficit in farming and in other industries.

* *
*

The discussed methods of prognostication of education reproduction is consistent with the contemporary classic scheme in studying socioeconomic systems which consists

of observations over the system, statement of a model, explaining the system behaviour, predictions of the consequences of the behaviour and the control over it (Naylor, 1971:7). The simulation model of educational reproduction permits us to represent the actual process theoretically, to investigate experimentally the complicated inner interrelationships in the formation of the educational potential of rural population.

The set forth conception summarizes the known demographic models of educational sphere, developed abroad and in this country, representing in an economico-mathematical form the transfers of students in the sphere of education with due recognition of demographic factors.

The simulation system developed on this basis enables one, with the help of computer, to implement long-run predictions of the educational potential of rural dwellers in conjunction with demographic projections. And experimentally studied is the influence of particular versions of educational sphere development, natural and mechanical movement of rural population on the anticipated educational potential. The model permits us to distinguish dimensions which are most relevant for the expected educational level and to predict "bottlenecks" in the development of the sphere "education-population" in the long run. The simulation within this model of various changes in educational sphere make it possible to predict beforehand the specific results of just these changes, i.e. to identify in the pure form the influence of different factors on educational reproduction.

In modeling population reproduction not only demographic processes must be taken into account, but the need of national economy for educational level of the employed population as well. According to this, some controlled models of education reproduction are to be matched with projections of the need for workers calculated on the basis of other models. The model of educational reproduction should be included into the common system of the models of educa-

tional sphere and to function jointly with them.

References

Bermant, M.A. et al.
1972 Mathematical Models and Planning of Education (Russian). Moscow: Nauka

Blaug, M.
1970 Economics of Education. A Selected Annotated Bibliography. Second edition. Oxford

Boyarsky, A.Ya.
1928 "Toward methodology of studying population literacy" (Russian). Vestnik stat. 3

Brezhnev, L.I.
1974 Speech at the election meeting of the voters of the Bauman electoral district of the capital (Russian). Pravda, June 15

Brezhnev, L.I.
1976 The report of the Central Committee of the CPSU and next tasks of the Party in home and foreign policy (Russian). Moscow: Politizdat

Goilo, V.S.
1975 Modern Bourgeois Theories of Labour Reproduction (Russian). Moscow: Nauka

Naylor, Thomas H.
1971 Computer Simulation Experiments with Model of Economic Systems

Khachaturov, T.S. et al., eds.
1975 Long-range Planning and Forecasting (Russian). Moscow: Progress

Maximov, G.M. et al., eds.
1972 All-Union Census of 1970 (Russian). Moscow: Statistika, v.3

Moser, C. and P. Redfern
1966 "A computable model of the educational system in England and Wales". Bulletin International Statistical Institute. Proc. of the 35th SESC v. VLI, Book 2. Beograd

Shlapentokh, V.
1975 How To-morrow Is Studied To-day (Russian). Moscow: Sovietskaia Ros.

Stone, R.
1967 "An application of balance method to population statistics as a means of planning education". Ekon. i mat. metody, v.III, 3

Valentei, D.I. et al., eds.
1975 Educational and Social-Occupational Structure of the Population of the U.S.S.R. (Russian). Moscow: Statistika

Nikolai Tikhonovich Nonkin

METHODOLOGICAL PROBLEMS IN FORECASTING THE EDUCATIONAL POTENTIAL OF RURAL POPULATION

Responsible for the issue
L.A. Khakhulina

Signed to be printed 16.07.1976
Paper format 60x84 1/16
Volume 1,4 printed sheets

Order No 199, 100 copies

Mimeographed at the Institute of
Economics & Industrial Engineering,
Siberian Branch of the U.S.S.R.
Academy of Sciences

Novosibirsk